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SOVIET WORK ON GAS ANALYSIS

[Numbers in parentheses refer to appended sources.]

At the opening meeting of the conference on gas analysis convened by the Commission of Analytical Chemistry of the Department of Chemical Sciences, Academy of Sciences USSR, in Moscow on 24 - 26 February 1949, (1) I. V. Tanayev gave a detailed account of the contemporary status of gas analysis and its importance in industry. He pointed to the necessity for very sensitive methods to detect minute traces of gases in industry and stated that automatization of the analysis, and microtechnique should form the bases of all gas analysis.

During the first two sessions of the conference reports on the analysis of natural gases were given. Doctor of Chemical Sciences E. K. Gerling gave a general evaluation of the analysis of natural gases. Doctor of Chemical Sciences V. A. Sokolov reported on methods of analysis of natural gases based on the absorption of the various components with suitable reagents and the use of gas analysis in the gas and oil industries (in all stages of the technology of these industries). N. M. Turkel'taub dealt with the adsorption method for the fractional determination of small concentrations of methane, ethane, and heavy hydrocarbons used in the geochemical exploration of petroleum. Prof L. A. Potolovskiy named several methods and apparatus used in the analysis of hydrocarbon gases and in the Central Scientific Research Institute of Aviation Fuels and Oils; he included a detailed description of the sulfuric acid method and the quantitative determination of isobutane in cracking gases. Prof A. A. Cherepennikov described his research work on the gases of potassium deposits, results of which have been used for some time as the basis for gas determination and gas control in the Solekamskiy Mines. Candidate of Chemical Sciences M. G. Gurevich told of his original research on methods and apparatus for the analysis of coal gases (of interest both in explaining the formation of coal and in solving the practical problems of the Soviet coal industry).

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The next two sessions were devoted to reports on the analysis of industrial gases. Candidate of Chemical Sciences M. M. Faynberg reviewed contemporary methods for automatic industrial analysis of gases, including the determination of oxygen, the analysis of multicomponent mixtures, and the determination of combustible gases in the air, as well as some general problems of gas methodics in the development of apparatus for this analysis. Doctor of Physicomathematical Sciences M. L. Veyngerov presented results of the use of the opticoacoustic method for gas analysis.

Candidate of Technical Sciences A. G. Amelin described the photoelectric method of analyzing gases through the formation of aerosols and gave results of experiments conducted in the Scientific Research Institute of Fertilizers and Insectofungicides which showed the possibility of determining the moisture in gases by using simple apparatus which give an accuracy sufficient for technical purposes. Candidate of Technical Sciences T. A. Zikeyev gave a detailed report on the requirements which adsorbents of oxygen must satisfy and told of work done in this connection at the All-Union Thermotechnical Institute. Candidate of Chemical Sciences M. I. Dement'yeva evaluated methods of analysis of the C_2 fractions of hydrocarbon gases, with emphasis on the errors caused by improper selection of the required absorption methods and a description of methods designed for greater accuracy.

Engineer N. A. L'vov described the electrical gas analyzers built by the Soviet Instrument Construction Industry. Candidate of Agricultural Sciences A. V. Trofimov reported on the determination of the isotopic composition of gases -- a new and very important field -- giving the principles of isotopic mass spectral analysis and results of such studies.

The fifth and final session consisted of the following reports: Candidate of Biological Sciences O. D. Khalizova described the use of gas analysis in industrial-hygiene chemistry to detect and to determine quantitatively harmful substances in the air of industrial installations; S. S. Gurvich, Senior Scientific Associate of the All-Union Scientific Research Institute of Labor Welfare, related methods developed by his institute for the determination of small concentrations of vinyl acetate, acetone, aniline, and sulfur dioxide in the air; and Candidate of Biological Sciences Ye. A. Peregud described a gas analyzer-colorimeter of the visual type constructed by the State Scientific Research Institute of Labor Hygiene and Disease Prevention, an appliance to determine harmful gases in the air.

Resolutions concerning organizational problems, the production of apparatus for gas analysis, the production of reagents necessary for gas analysis, research, experimental, and construction work necessary to produce accurate apparatus, personnel requirements, and published literature were then adopted by the conference. These resolutions (2) are summarized as follows:

It was decided to enlist the aid of the Ministry of Higher Education to further the training of personnel in analytical chemistry and also to induce a wider range of subjects for dissertations. It was decided also to request the All-Union Chemical Science Society imeni D. I. Mendeleev to establish a group for gas analysis in the society's analytical chemistry section. The need for handbooks and reference books on the subject was cited.

Other recent work on gas analysis includes the following:

On the basis of work done in the Laboratory of Organic Catalysis imeni Academician N. D. Zelinskiy of Moscow State University and in the Laboratory of Analytical Chemistry of Saratov Agricultural Institute, N. Z. Kotelkov of the latter organization presented suggestions (3) for improving gas analysis apparatus originally constructed by the VTI (All-Union Thermotechnical Institute). In this study of VTI apparatus, Kotelkov investigated the catalytic oxidation of gaseous mixtures of H_2 and CH_4 with palladium deposited on

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nichrome, and of CO, H₂, and CH₄ with platinum deposited on nichrome. He was able to establish that, in the VTI apparatus, the Fisher loop of cupric oxide could be replaced successfully by the two above-named catalysts. The necessity of a container for additional oxidation over a platinum wire was thus eliminated. With platinized nichrome, carbon monoxide was quantitatively determined by oxidation, and the necessity for its absorption in absorption containers is eliminated. Kotelkov also suggested other concentrations of bromine and pyrogallol and mentions that A. A. Tolstopyatova and associates at the Laboratory of Organic Catalysis imeni Academician N. D. Zelenskiy of Moscow State University have made a similar suggestion.

SOURCES

1. "In the Department of Chemical Sciences, Conference on Gas Analysis," Vestnik Akademii Nauk SSSR, No 9, 1949.
2. "Resolutions of the Conference on Gas Analysis...", Zhurnal Analiticheskoy Khimii, Vol IV, No 6, 1949.
3. N. Z. Kotelkov, "The Analysis of Gases With VTI Apparatus," Zhurnal Analiticheskoy Khimii, Vol V, No 1, 1950.

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